operated upon to take air at the surface of the water, they neither presented in their movements nor in their mode of life any apparent modification, the cutaneous respiration replacing the branchial.—*Comptes Rendus*, August 5, 1867, pp. 242–246.

Note on my former Communication on a supposed New Species of Planarian Worm.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,—In the October Number of the 'Annals' I drew your attention to what I believed to be an undescribed species of a Rhabdocœl Planarian worm, which I proposed to call *Typhloplana nigra*. Living as I do in the country, I am in a great measure dependent on my own library for books of reference. Since writing to you, I have procured a copy of Oscar Schmidt's work 'Die Rhabdocoelen Strudelwürmer,' and on Taf. 4. fig. 10 I find an excellent figure of my Planaria, which appears to be not a *Typhloplana*, but a *Mesostomum*, and the *M. personatum* discovered by Schmidt. From what Dr. Schmidt says, it appears that the adult animal is possessed of eyes, which, however, are concealed in the black pigment; young individuals just emerging from the egg have two distinct eye-specks. The chief difference between the genera *Mesostomum* and *Typhloplana* is the absence of eyes in the latter. Hence, as I could discover none in the specimens I examined, I referred the creature to the genus *Typhloplana*. It is, however, clearly identical with the *Mesostomum personatum* of Schmidt, and I cancel my former conjecture, and add this species of Rhabdocœl planaria to the British fauna. *Hab.* Reedy pond near Preston.

I remain, Gentlemen,
Yours sincerely,
W. Houghton.

Preston Rectory, Wellington, Salop.
Nov. 15, 1867.

On the Development of Sepiola. By E. Mecznikow. (Notice by E. Claparède.)

As M. Mecznikow's memoir is published in Russian, we give a rather detailed notice of it.

Besides the old writings of Bohadsch and Delle Chiaje, we possess on the development of the Cephalopoda an unsatisfactory memoir by M. Van Beneden, and a more important work by M. Kölliker. The latter, although more complete, still leaves some gaps to be filled up.

The ova of the *Sepiolæ*, investigated at Naples by the author, resemble the eggs of the common fowl in their form, although not in their size (they are only 4 millims. in length); they are contained to the number of fifteen together in a colourless mucilage. Each ovum is furnished only with a single envelope; this chorion does not appear to correspond with the outer membrane of the ova with double envelopes of other Cephalopoda (*Sepiæ*, Squids), but rather to their inner envelope, which M. Kölliker and others have regarded as the vitelline membrane. This latter denomination seems

to be incorrect; at least, in the *Sepiolæ* this membrane is furnished with a micropyle, and must therefore be considered a chorion.

The ova of the *Sepiolæ* are completely transparent. Their development lasts from thirty-four to thirty-five days. The chorion undergoes modifications in proportion as the fœtus is developed: it increases in size and its thickness diminishes; moreover it changes its form, and, from being ovoid, becomes spherical towards the close of the development.

The author distinguishes three periods in the embryogenic development of the *Sepiolæ*: the first, which extends to the completion of the blastoderm, lasts ten days; the second, during which the organs appear, lasts only five days; and the third, during which the organs previously formed are gradually developed, lasts nineteen or twenty days, and terminates with the exclusion.

First period.—The phenomenon of partial segmentation has not been studied from its commencement by the author. The youngest ova which he had under his hands already had the pointed pole of the vitellus covered with embryonal cells. Between this first rudiment of the blastoderm and the chorion some drops of protoplasm seem to correspond to the supposed directive cells (*Richtungsbläschen*) of the Gasteropods, Insects, &c. The nucleated cells of the blastoderm form at first a single layer; they seem to multiply by division. Towards the end of the second day, the blastoderm is extended so as to cover two-elevenths of the vitellus.

On the third day the blastoderm divides into two superposed lamellæ. This stratification seems to be the result of a transverse division of the primitive cells. The two lamellæ are similar in thickness, but in each of them the thickness diminishes towards the margins of the blastoderm.

In the latter part of this period the edges of the blastoderm gradually extend over the vitellus. They envelope the half of it by about the eighth day, and on the tenth they meet at the superior pole of the ovum, enveloping it entirely. The rapidity of the growth in the last two days is explained by the difference of thickness of the different parts of the blastoderm. In fact the lower region, corresponding to the future embryo, presents a much greater thickness than the upper part, which is to become the vitelline or umbilical vesicle. During the whole of this first period each of the lamellæ of the blastoderm is formed only by a single layer of cells. These are capable of executing very marked amœboid movements.

Second period.—From the commencement of this period the cells of the outer lamella of the superior part of the blastoderm become covered with vibratile cilia, the movement of which causes a rotation of the embryo. At the same time the blastoderm (especially the inner lamella) thickens in its lower region, and the fœtus begins to be distinguished from the vitelline vesicle placed above it. Soon a thickening of the blastoderm with an oval outline makes its appearance on each side of the body, a little below the equator of the vitellus. These inflations, which belong essentially to the outer lamella, and which from the second day are very distinct, are the

rudiments of the eyes. At the same period there appears on one side of the ovum a small fold of the outer lamella, which speedily extends all round the embryo, and constitutes the rudiment of the mantle. On the second day, also, the mouth shows itself on the ventral surface as a depression in the form of a horseshoe. Then the branchiæ originate, and the first two pairs of arms and the organs of hearing. All these organs are formed chiefly at the expense of the inner lamella, the outer lamella serving them only as a protective envelope. On the third day of this period, the rudiment of the mantle presents on the dorsal side a partial thickening of the outer lamella, corresponding to the point which will subsequently serve for the secretion of the *os Sepiæ*.

At this period the embryo is constricted in its middle by a line of demarcation which divides it into two parts: the lower one is the fœtus properly so called; the upper one includes the arms and the vitelline vesicle. The two lamellæ of this vesicle separate from each other, although still united by very fine fibres, which are probably prolongations of the cells of the inner lamella.

On the fourth day the anal tubercle and the rudiment of the siphon (infundibulum) make their appearance. This last is formed of two distinct bands, inclined 45° towards the equator and diverging from above downwards. These bands are thickenings of the inner lamella; the outer lamella simply covers them, without taking part in their formation. The intestinal canal, the acoustic sacs, the eyes, and the mantle appear with increasing distinctness; so that towards the end of the second period the fœtus already presents the characteristic form of the Cephalopoda. At this period, also, appear the fins, the third pair of arms, and the nervous and arterial centres.

On the fifth day the constriction between the fœtus and the vitelline vesicle has become much deeper. The vitelline vesicle begins to perform alternate movements of contraction and expansion of its two lamellæ. These movements are due to very delicate fibres, similar to those which M.Mecznikow has described in the amnios of the scorpion. Below the vitelline vesicle the two cylindrical parts which form the true lateral parts of the embryo (that is to say, the *cephalic sinuses* of M. Kölliker) become prominent. Their outer region is divided into two parts, of which the upper contains the eyes and the ophthalmic ganglia, whilst the lower contains the cartilages and the lateral branches of the vitellus of nutrition. Further back the mantle and the parts of the body clothed by it are seen. The fœtus terminates below in the two projecting fins. On the fifth day, when the number of arms is still only three pairs, none of these appendages is yet furnished with suckers.

At the end of this second period the two halves of the siphon approach and become united to form an unpaired organ; the posterior part of the intestinal canal (independently of the anterior) divides into two cavities, the rectum and the ink-bag, the walls of which are formed at the expense of the outer lamella; the two pericardia appear at first as solid masses immediately below the branchiæ; the eye becomes surrounded by a layer of pigment, in which, when

strongly magnified, numerous colourless nuclei are detected; lastly, the mantle becomes covered with small tubercles furnished with vibratile cilia. By means of these cilia and of the ciliary coat of the vitelline vesicle, the embryo executes continual movements of rotation, which persist until the end of its embryonic development.

In its anterior part the vitellus of nutrition presents a projection corresponding to the mantle; it also gives off two prolongations into the cephalic sinuses beneath the optic ganglia. The author denies that this vitellus is surrounded by the proper membrane described by M. Kölliker.

Third period.—During this period the apparition of new organs plays quite a secondary part. The essential phenomenon is the development and change of proportions of the organs already existing in a rudimentary state. In fact we have hardly anything to indicate except the appearance of the fourth pair of arms towards the commencement of the second half of this period, and that of the fifth pair towards its end. The vitellus of nutrition passes by little and little into the body of the fœtus, and finally only represents a sort of wart upon the head between the bases of the arms. This external vitellus communicates with that of the interior of the body by a delicate band which passes through a small orifice situated below the mouth. At the moment of exclusion, this last vestige of the external vitellus passes entirely into the interior of the body.

In this last period occurs the organization of the skin, formed at first of two layers of cells, one representing the dermis, the other the epidermis. In the former the chromatophora soon make their appearance; they are at first immobile, but afterwards change their form under the influence of muscular fibres, which are developed about the middle of this period. It is also at this epoch that we witness the first appearance of small very refractive granules, which, by their union, will subsequently form the dorsal bone. During this third period the cartilages are formed at the expense of the inner blastodermic lamella. The ocular cartilages are the first formed. This is also the period of the formation of the sucking-disks on the arms. The nervous system becomes more differentiated, and the stellate ganglia appear.

On the first day of the third period, the envelope of the eye divides into two laminæ, the outer of which alone presents a central orifice. The crystalline has at first the form of a small rod attached to the rudiments of the ciliary body. It is a homogeneous body, originating by the hardening of the secretions of the ciliary body (as has already been shown by M. Hensen). Towards the end of this period a kind of cornea is formed; at the same time we see a great number of very fine fibres, producing the characteristic phenomena of interference, make their appearance in the silvery coat. The author refutes the opinion of M. Kölliker, according to which the organs of hearing make their appearance in the form of compact and solid bodies. He asserts that in the *Sepiolæ* the formation of these organs presents a complete parallelism with what we know of their development in the Vertebrata. As to the

organ of smell, it does not appear until after exclusion; and this is the case also with the rudiments of the generative organs.

The two blastodermic lamellæ, which play so important a part in the development of the *Sepiolæ*, are called by M. Mecznikow the *epithelial* (exterior) and *parenchymatous* (interior) lamellæ. The author does not use these terms in an absolute sense, since the epithelial membranes of the vessels are formed at the expense of the interior lamella. We may say that the epithelial lamella gives origin to the general envelope of the body, the cartilages, the organs of sense and digestion (except the pharynx), and the ink-bag. The inner layer gives origin to the muscles, the nervous system, the mass of the pharynx, and the vascular system. According to M. Mecznikow, these two lamellæ correspond exactly to what he has described in the embryos of the scorpions.

From the preceding statements it appears that the formation of the nervous system of the *Sepiolæ* cannot be paralleled with that of the same system in the Vertebrata. On the other hand, the formation of the skin and of the organs of sense in the *Sepiolæ* is effected, as in the Vertebrata, at the expense of the interior lamella. Hensen's observations upon chickens seem also to authorize a parallelism between the formation of the internal skeleton of the *Sepiolæ* and that of the *chorda dorsalis* in the Vertebrata. The intestinal canal of the *Sepiolæ* is produced chiefly at the expense of the epithelial lamella, which is not usually the case in Vertebrata. However, in *Amphioxus*, according to M. Kowalewsky, the intestinal canal is formed by an invagination of the epithelial lamella. M. Mecznikow rejects all analogy between the foot of the Cephalophora and the siphon (*infundibulum*) of the Cephalopoda. He is equally adverse to the hypothesis of M. Häckel, according to which the Pteropoda are the immediate ancestors of the Cephalopoda.—*Bibl. Univ.* Oct. 25, 1867; *Bull. Sci.* pp. 186–192.

M. LeVaillant, the African Traveller.

Mr. Edgar Layard says:—"I have been at some little pains to trace LeVaillant's footsteps in Southern Africa, in order, if possible, to identify such of the birds as have been introduced into his great work as South African, but which are supposed by some to have been obtained from other countries. A statement which appeared some time ago in the serial 'Household Words,' to the effect that LeVaillant never was in South Africa, also stimulated my desire to obtain full information regarding him.

"I need not follow him through all his wanderings at this moment; this I may perhaps do at some future time. Suffice it for my present purpose to say that I do not believe that he ever crossed the Orange River.

"He describes in his travels how he was floated across the swollen river, and his chase after the giraffe. I question much if this account is true. There was living at Camiesburg, within the last few years, an aged woman named Van Zyl, who related to my informant that